

**From:** [Harre, Daniel \(Blunt\)](#)  
**To:** [Bernard-Drakey, Jamie](#)  
**Subject:** RE: Release constituent concern to MDNR ?  
**Date:** Monday, April 16, 2018 1:20:49 PM  
**Attachments:**

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Hello,

Mr. Campbell has given his consent for us to release the document. You may release it to the MDNR and the public.

Thank you,

Daniel Harre  
Staff Assistant, United States Senator Roy Blunt  
1123 Wilkes Boulevard, Suite 320  
Columbia, Missouri 65201  
Phone: 573.442.8151 Fax: 573.442.8162



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**From:** Bernard-Drakey, Jamie <Bernard-Drakey.Jamie@epa.gov>  
**Sent:** Friday, April 13, 2018 9:08 AM  
**To:** Harre, Daniel (Blunt) <Daniel\_Harre@blunt.senate.gov>  
**Subject:** Release constituent concern to MDNR ?

Daniel,  
Missouri Department of Natural Resources has asked to have a copy of the attached background document, on concerns expressed by Doug Campbell related to Fantastic Caverns and EPA's air standard for TCE vs OSHA (see attached content). Does your office consider this document releasable to MDNR? I deleted the Privacy Release cover page because it contained a social security number and I also deleted your cover email. MDNR is interested in the substantive content of the constituent concern.

Does your office consider the attached releasable to the public ? Once MDNR has it in their files, they usually are required to release it under sunshine requests, so it is not easily protected in their files. I think MDNR already has a copy of pages 2 through 4 through other sources, so only the first page is new information to them.

Thank you,

Jamie Bernard-Drakey  
EPA Region 7  
Lenexa, KS  
913-551-7400

1. State Agencies, MDNR and DHSS are enforcing 2 workplace standards for TCE
2. OSHA standard is 100 ppm while EPA's target is 6 micrograms per meter. EPA's target is 90,000 times more stringent.
3. EPA's targeted value is just that "A Target". The science supporting EPA's targeted value is limited and poor. And has not gone through an official review process.
4. Fantastic Caverns is 3.5 miles from the 30 year old contaminated site. If EPA's target of 6 applies to Fantastic Caverns it will include much of North West Springfield. Including Hundreds of businesses, thousands of residents, and public schools.
5. The impacted area is 32 square miles. How do we fix the problem? Both DNR and DHSS have said EPA's target of 6 is questionable and unrealistic. It would make sense that a standard in between EPA and OSHA would make sense.

**TRICHLOROETHYLENE (TCE) PROBLEM IN FANTASTIC CAVERNS  
AND IN A LARGE PART OF WESTERN SPRINGFIELD.**

February 28, 2018

Tom Aley, Missouri Registered Geologist #989,  
President, Ozark Underground Laboratory, Protem, MO  
Consultant to Fantastic Caverns, Springfield, MO.

**Source of the TCE in Fantastic Caverns**

- It is derived from the former Litton site near the Springfield Regional Airport. TCE was discharged into the subsurface decades ago and was never effectively contained. Litton, now owned by Northrup Grumman, is the sole identified Potential Responsible Party (PRP) for TCE in Fantastic Caverns. TCE was never used on the Fantastic Caverns property.
- TCE follows multiple migration pathways; it is the Houdini of chemicals and is present in both air and water. It can move into and out of both air and water and be replenished for decades from contaminated groundwater and especially from discontinuous underground pockets of nearly pure TCE within the epikarstic zone.
- The epikarstic zone, up to 100 feet thick at the waste site, is below the soil and above the water table. There has been no extraction or remediation of TCE from the epikarstic zone at the waste site.
- In well-developed karst areas with sinkholes and caves there is extensive lateral movement of underground air driven by differences between surface and underground temperatures. The seasonal air movements are toward lower surface elevation areas in summer and toward higher surface elevation areas in winter.

**Regulatory Limits for TCE Concentrations In Air**

- OSHA workplace standard: 100 ppm over an 8 hour day in air = 540,000 micrograms per cubic meter of air.
  - o 1978 estimate by NIOSH 100,000 workers with full-time exposure plus up to 3.5 million more workers with continuous low level exposures or brief exposures.
- EPA target concentration under CERCLA (Superfund): 6 micrograms per cubic meter of air. This target concentration has not gone through rule-making procedures.
- The two federal limits vary by a factor of 90,000. That is a ludicrous difference.
  - o The science supporting the EPA value is limited and of poor quality.
  - o Years of major industrial exposures and millions of worker-years of TCE exposure have not suggested major problems.
  - o However, EPA may be right in pushing such a low concentration limit. It has been developed by risk assessors in the Agency for Toxic Substances and Disease Registry (ATSDR).
- EPA Region 7 "encourages" MDNR to adhere to the 6 micrograms per cubic meter target. Not all EPA regions are complying with this target limit.
- In EPA's view the target concentration does not just apply to the waste site and adjoining properties but also to any place the TCE can be detected. Fantastic Caverns shows that this is a "penalize the victim strategy".

- In Fantastic Caverns, 3.2 miles from the Northrup Grumman site, MDNR has measured TCE in cave air at 2,400 micrograms per cubic meter. This is 400 times greater than the EPA target.

#### **Size of Northrup Grumman's Impacted Area.**

- There are over 32 square miles of land closer to the Northrup Grumman waste site than the point in Fantastic Caverns where the TCE concentrations are 400 times greater than the EPA target value.
- For comparison, the Route 66 Missouri State Park (the former Times Beach town and dioxin site) is 419 acres (0.655 square miles). The 32+ square miles Northrup Grumman site is 50 times larger. Times Beach was a monumental cleanup effort that displaced about 2,000 people. The Northrup Grumman impacted area probably has ten times that many people plus businesses, churches, and schools.
- This may well be one of America's largest hazardous waste sites. This is due to a combination of the karst topography, large discharges of TCE into the subsurface, and years of not controlling off-site migration of TCE. Fantastic Caverns has provided a window into the extent and nature of the underground pollution.

#### **The Fantastic Caverns Experience To Date**

- Rather than require Northrup Grumman to initiate major cleanup efforts MDNR and Missouri Department of Health and Family Services focused their attention in 2016-2017 on Fantastic Caverns, a family business that never used TCE.
- The approach of the state agencies was strictly regulatory and in keeping with a "penalize the victim strategy". In no way was it designed to help solve the problem or even to require Northrup Grumman to pay the substantial costs incurred by Fantastic Caverns in rapidly bringing the problem under control so that they could remain in business.
- Fantastic Caverns has drilled a 23 inch diameter ventilation shaft, installed 3 airflow control structures including 2 with large capacity fans, and retained the Ozark Underground Laboratory (OUL) as their consultant on TCE issues.
- The OUL has:
  - Conducted problem-solving studies and prepared a summary report on management actions, findings, and management conclusions from TCE and cave environmental monitoring investigations dated January 29, 2018. Copy has been sent to MDNR.
  - Prepared a 2018 cave air management plan dated February 8, 2018. Copy has been sent to MDNR.
  - Conducted training sessions for Fantastic Caverns employees on the TCE issue; more will occur in 2018.
- The artificial ventilation required to keep TCE concentrations in cave air below the 6 micrograms per cubic meter is damaging to the cave's environment. The annual moisture loss from moist cave surfaces due to the artificial ventilation is 40,000 gallons.

#### **What Is Being Done at Fantastic Caverns for 2018**

- The cave air management plan has been implemented. It includes:
  - Monthly (and 4 semi-monthly) sets of TCE measurements made of cave air.
  - Routine alpha radon daughter monitoring as an "early warning" system for conditions likely to be associated with elevated TCE concentrations.
  - Environmental monitoring and actions to help mitigate damage to the cave and its environment.

- In the next few months OUL and consultants to Northrup Grumman will design and construct a network of vapor extraction wells on Fantastic Caverns property capable of substantially reducing TCE concentrations in the air of toured portions of the cave. This work will include electrical resistivity and natural potential geophysical surveys that identify potential targets for drill holes plus various related studies and measurements. This is a unique karst-specific approach. A similar (but much expanded) vapor extraction program might ultimately be used at and around the Northrup Grumman waste site.

#### **How Missouri Agencies Can Help**

- Support the Fantastic Caverns Cave Air Management Plan and use Agency Influence to ensure that Northrup Grumman pays for all parts of our Plan including those parts designed to protect natural resources in the Caverns.
- Managing TCE concentrations in underground air and protecting the cave's environment is complex and developing a good operational plan for the future will require substantial experimentation. This is exactly what we are doing, even though Fantastic Caverns is the victim of years of poor conduct by others. We expect, and will appreciate, an understanding attitude from Missouri agencies as we move forward.
- Source control of TCE vapors in the epikarstic zone in and around the boundaries of the former Litton site is clearly needed and must be required by MDNR. Such source control is essential for substantially reducing TCE concentrations reaching off-site properties including Fantastic Caverns.
- Especially under winter conditions it is highly likely that there are numerous buildings surrounding the Northrup Grumman waste site where intrusion of TCE vapors into buildings exceeds the EPA target concentration of 6 micrograms of TCE per cubic meter of air. MDNR and/or the Missouri Department of Health and Family Services needs to institute a program of monitoring with Summa canisters adequate to assess the extent of this TCE vapor intrusion with a level of zeal at least equal to that which was focused on Fantastic Caverns.
- Enforce the TCE target of 6 micrograms per cubic meter of air only on waste sites and adjoining properties. Applying this target to properties miles away is unfair and arbitrary.

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